METAL CASTING

Project Fact Sheet

A New "Direct Pour In-Mold" (DPI) Technology for Producing Ductile and Compacted Graphite Iron (CGI) Castings

Energy saving technology for casting will increase yields and reduce magnesium fumes

Benefits

- Offers saving of 0.5 trillion Btu by 2010
- Eliminates need to hold magnesium-treated metal
- No magnesium fumes released to atmosphere
- No post inoculation required
- Increases mold yield

Applications

The market focus for DPI technology are the foundries engaged in ductile iron and compacted graphite iron casting production.

A new "Direct Pour In-Mold" (DPI) treatment technology, developed by Comanche Technologies, produces both ductile and CGI castings by pouring a base metal directly into a specially designed container, which is inserted into a mold. Each of the various sized containers provides all of the necessary components to produce a specific amount of treated and filtered metal. The DPI containers provide energy savings of 13.3% over comparable treatments, increased mold yields, very high magnesium recovery, no magnesium emissions, and no post-inoculant treatment is required.

Computer modeling is required to fine tune metal flow rates of the various sizes of containers. Extended trial runs are needed to verify present data, and determine if design changes are needed. Metallurgical parameters must also be determined for the various commercial grades of ductile iron and CGI, such as an acceptable base metal sulfur range, microstructure evaluations, and physical properties of the final metal. Unit cost will be a large factor in industry acceptance; therefore, automation of the container manufacturing process will be required.

Direct Pour In-Mold (DPI)

Pouring DPI container in test foundry to produce ductile iron casting.

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Project Description

Goal: To optimize the end design of the DPI unit(s), conduct extended foundry testing for performance data collection, and accurately determine the foundry cost-savings directly attributable to the DPI technology.

This invention combines two proven foundry techniques, in-mold magnesium treatment and the direct pour method, to produce a unique technology, Direct Pour In-Mold (DPI). This technology solves several problems associated with the standard in-mold treatment, plus it adds the considerable benefits of direct pour. DPI benefits include significant energy savings, increased mold yields, very high magnesium recovery with zero fumes emitted, and no post inoculation is required. The use of a thin cast magnesium treatment alloy assures consistent, repeatable, treated metal that produces quality ductile and CGI castings.

Progress and Milestones

The following are the main tasks to be performed:

- Finalize the DPI unit internal design structure using flow modeling and prototype testing results.
- Calibrate the treatment alloy weight to produce repeatable metallurgical parameters for ductile iron and CGI.
- Apply the DPI technology to other applicable casting techniques such as green sand, flaskless, and chemical bonded sand.

Economics and Commercial Potential

The market focus for DPI technology are the foundries engaged in ductile iron and CGI production. The CGI market is small when compared to ductile iron, but is expected to grow in the coming years. Comanche Technologies plans to license the DPI technology to foundry product suppliers and to provide technical support to their customers. Commercial introduction of the technology is expected by 2004. Annual energy savings by 2010 would be 0.5 trillion Btu. By 2020 the savings would grow to 4.8 trillion Btu.

The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and to conduct early development. Ideas that have significant energy-savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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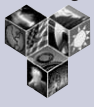

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